

## JOSEPH C. CHAMBERLIN 1898–1962

Joseph Conrad Chamberlin was born in Salt Lake City, Utah, on 23 December 1898, the first child of Ole and Mary Ethel (Conrad) Chamberlin. Both of his parents were descended from early Mormon pioneer families. His father's ancestry was mainly English, while his mother's family had English and German roots.

His father died in 1911, leaving the family nearly destitute. Being the eldest child in the family, Joseph had great responsibilities placed on him to help support the family and assist in the care of his brothers, Philip and Ole Wilbert, and sister, Dorothy. In 1914, after completing only a year of high school, he left school in order to supplement his mother's modest salary. For the next three and a half years, he worked as a sheep herder and camp tender on his uncle's large sheep ranges, and as a repairman and tester for a local company making the radios of the day.

In October 1918, just before the end of the First World War, Chamberlin was drafted into the U.S. Army. Shortly afterwards, he was stricken by the terrible influenza epidemic that swept through the United States that year. This developed into pneumonia, at which point almost all hope for his life was abandoned. With so many men sick and dying and so few doctors, all that could be done for most of the patients was to make them comfortable and leave them to die. However, a nurse took an interest in Chamberlin and persuaded the doctors to help him. His most serious problem was a condition (empyema) affecting his left lung. The treatment at the time was to remove a rib closest to the affected lung in order to collapse it. Despite the severe pain and trauma of the surgery (he was too weak to be given an anesthetic), he slowly began to improve, and finally recovered.

After the end of the war, Congress passed legislation allowing veterans to receive a year of free tuition at an accredited school, to help them return to civilian life. In the fall of 1919, Chamberlin enrolled at the University of Utah, taking preliminary courses in mechanical en-



Joseph C. Chamberlin  
Palo Alto, 1928

gineering. Although he had been seriously interested in pursuing a career in the biological sciences for quite some time, the family's circumstances led him to choose what seemed to be the quickest and most practical way to gain a profession.

When Congress voted to revise the previous legislation and allow veterans to obtain a full four years of schooling for an academic degree, Chamberlin's uncle—the arachnologist Ralph Vary Chamberlin—counseled him to apply for a transfer to Stanford University to study Entomology. Although he only had about a year of high school, the usual entrance requirements were waived because of his status as a veteran and he was accepted as a "Special Student" in the Department of Zoology, majoring in Entomology.

At Stanford, he soon came under the tutelage of Prof. Gordon Floyd Ferris, who was to become a lifelong friend. Although only five years older than Chamberlin, Ferris al-

ready had an international reputation as an entomologist. The two men had similar backgrounds and shared much the same outlook on science. Ferris trained Chamberlin as a systematic entomologist, describing him as "an excellent student, one of the best that we have had here for many years." The most obvious sign of Ferris' influence can be seen in the development of his drawing technique. Chamberlin was soon producing illustrations with a combination of artistry and accuracy that has never been rivaled for pseudoscorpions. Ferris' influence did not, however, sway Chamberlin from his early passion for these endearing animals.

"My interest in the false scorpions dates from a chance encounter with one while still a school boy in my home town of Salt Lake City, Utah. I was busily engaged in creating a miniature zoo of backyard jungle denizens—complete with pill box cages provided with close set pins in lieu of bars. Among the candidates for this zoological garden was a queer flattened tick-like creature with enormous crab-like claws which it handled as dexterously as a boxer his gloved fists which, to my unaided eye, they resembled.

I made a number of penciled sketches of this mysterious 'boxing bug' showing its various stances. It possessed an enormous fascination for me, what with its sudden alerts, its tentative advances, and precipitate retreats. I never forgot it, in spite of the fact that it was years before I saw another representative—this time as a sophomore student in entomology at Stanford University in the fall of 1920. My interest—and memory—immediately revived, and now with books and microscope at hand I was able to identify my mysterious 'boxing animal' as a pseudoscorpion. That was the spark, and with an inspiring teacher at hand in the person of Gordon Floyd Ferris, I was encouraged to find out 'everything I could' about these little arachnids. . . ." (J.C. Chamberlin, unpubl. manuscript).

After having been at Stanford for only a year, he was invited to take part in the California Academy of Science Expedition to the Gulf of California, which lasted 87 days (April 17–July 10, 1921) and sailed a total of

1811 miles (Slevin 1923). This was quite an honor, since such invitations were usually only given to promising graduate students. Although nominally assistant to the entomologist, P. Van Duzee, during the expedition, Chamberlin was given much latitude to pursue his own interests. He collected a wide range of groups, reflected in the species named after him (e.g., *Bulimulus chamberlini* Hanna (Gasteropoda), *Centrioptera chamberlini* Blaisdell (Tenebrionidae), *Ticida chamberlini* Van Duzee (Hemiptera), *Evagrus josephus* R.V. Chamberlin (Araneae) and *Euphorbia chamberlini* Johnston). Naturally, he also found a large number of new pseudoscorpions, including the first known specimens of the remarkable family Menthidae Chamberlin.

In 1923, he obtained his B.A. degree in Entomology "with distinction" and published an important monograph of the lac insects (Coccidae). The following year, he graduated as an M.A., again in Entomology. The subject of his master's thesis was originally "The application of graphical methods to a study of systematic biology, particularly systematic entomology," but this proved to be too broad and was changed to "A revision of the higher classification of the arachnid order Pseudoscorpionida, as based primarily upon a collection from the British Museum of Natural History." From 1924–26, he was an Entomology Assistant at the University of California Citrus Experimental Station, located at Riverside, California. During 1926 to 1928, he was an Instructor in General Biology at San Jose State Teachers College (now San Jose State College) in California, where he taught botany and other courses in biology, including one on the entomology of subtropical fruits. Chamberlin put a great deal of enthusiasm and vitality into his teaching and was much appreciated by his students. For a brief period (1927–1928), he worked as a part-time Special Investigator on the physiological effects of certain chemical sprays on living plants for the California Spray-Chemical Company, San Jose, California.

In 1929, he received his Ph.D. from Stanford University. His thesis was published in two parts. The first part was a series of systematic papers (1929–1930), in which the classification of the order was redefined and a large number of new taxa were described at all levels. The second part was his famous

monographic study of the comparative morphology of pseudoscorpions, entitled *The Arachnid Order Chelonethida*. Although completed soon after the systematic papers, problems at Stanford University Press caused a two-year delay in its publication. However, once published, this work radically changed the way in which pseudoscorpions were studied. Its pages are filled with original insights, abundantly illustrated with high-quality drawings. It has inspired all subsequent students, and is still the standard reference on the morphology and evolution of the order.

The classification that resulted from these studies remained largely unchallenged for over half a century. It was not until the publication of Harvey's (1992) cladistic analysis that an alternative was proposed. The durability of Chamberlin's classification is due not only to the quality of his work, but also to his remarkably modern outlook on systematics. Indeed, Chamberlin was one of the first to argue for what we would now call a phylogenetic (Hennigian) classification.

In an unpublished manuscript, quoted at length by Ferris (1928), Chamberlin argued that speciation was fundamentally dichotomous and that each dichotomy in a phylogenetic system, whether it is named or not, is a group or category of species. Each dichotomy, in turn, is of equal rank: "One branch, for example, might contain its full quota of eight species, while its alternative branch might contain but one. On this basis the single species is genetically the equivalent of the other eight." These ideas were applied to his classifications of both lac insects (1923) and pseudoscorpions (1931), for which fully-dichotomous, branching diagrams were presented, with all taxa treated as terminal (non-ancestral). There is an exact correspondence between these diagrams and the classifications, with sister groups being given equivalent rank. The only element of modern cladistics missing from his work was the concept of synapomorphy, but even here, Chamberlin recognized that negative criteria should be avoided whenever possible, believing that phylogenetic unity was revealed by "positive morphological criteria." It is not known whether Chamberlin's ideas influenced the development of phylogenetic systematics, but it would be surprising if Hennig had never read

Ferris' (1928) *Principles of Systematic Entomology*.

By the time his monograph was published, Chamberlin had raised the number of recognized families in the order from five to eighteen. Anticipating criticism of "inordinate 'splitting,'" Chamberlin (1929) argued that the large number of new supraspecific taxa was justified by the fact that only a small proportion of the world's species was known. However, he also considered Chelonethi to be a very ancient group. Writing to Hirst, in 1922, about the discovery of arachnid fossils in the Rhynie chert, he said

"I hope your material has not yet run out and that ultimately a pseudoscorpion may turn up in the same formation. I personally strongly incline to the belief that they must have existed at least as early as the middle Paleozoic. As you know there are no known pseudoscorpion remains from before the Oligocene (amber), and hence discovery of true Paleozoic remains would be a find of the first order. I certainly hope you are lucky enough to make it."

This remarkable prediction has been confirmed by the recent discovery of a Devonian fossil, which is very similar to modern groups (Schawaller et al. 1991).

In the same month that the monograph was completed, Chamberlin accepted a position with the U.S. Department of Agriculture in June 1929, as leader of the Beet Leafhopper Project at the Twin Falls Field Station, Idaho, becoming Chief of the station in 1932. This was followed by assignments to the field stations at Modesto, California (1935–1936) and Corvallis, Oregon (1936–39). In 1939, he moved to the Forest Grove Field Station, Oregon, where he was to spend the rest of his career, retiring as its Chief in 1961. From 1937–1943, he was head of the Pea Weevil Investigation and later of the Pea Insects Investigations, which were later broadened into a general study of insecticide application methods. This involved studying methods of applying insecticides from the air, a topic on which he was invited to speak at the Tenth International Congress of Entomology in Montreal, in 1956.

During the summers of 1943–1946, he was given a special assignment to study the insect



Joseph C. Chamberlin (left) and Gordon F. Ferris (right) at the 10th International Congress of Entomology, Montreal, Canada, 1956.

fauna of the Matanuska Valley in Alaska, in conjunction with the University of Alaska Experiment Station, located at Palmer, Alaska. Although Chamberlin's career as an economic entomologist was a distinguished one, he always regretted that his abilities as a teacher and researcher could not be utilized more directly. Unfortunately, systematic research was not a priority for the USDA and his requests to be transferred to a less applied bureau were to no avail.

Chamberlin was elected to membership of the Phi Beta Kappa and Sigma Xi fraternities in 1923; a Stanford University Fellow (1923–24); a Fellow of the American Association for the Advancement of Science in 1928; and a Fellow of the Entomological Society of America in 1938. He was also a member of the Oregon, Washington and Pacific Coast entomological societies, serving on the publications committee of the latter. In 1962, he received a citation from the Oregon Academy of Sciences for his "outstanding service to the field of Science."

On 26 May 1923, Chamberlin married Clara Hya Gladstone, a young Russian woman and recent emigrant to the United States. They

had five children: Laura Anne (1924), Phyllis (1926), Mary Joan (1930), David Conrad (1932) and Alice Ruth (1937). The marriage ended in 1938, and six years later, in 1944, he married Mrs. Charlotte May (Guerdan) Young.

Despite his intellectual accomplishments, Chamberlin was a very down-to-earth and unassuming man, a congenial host, kind and generous to his friends and family, and possessed of great natural artistic gifts. As David Malcolm put it:

"Joe was a warm, kindly, extremely generous, and out-going man with a quick wit and a delightful sense of humor. He loved a good laugh. He loved life, his friends (who were many), and his work. . . He was meticulous and thoughtful in all he approached, a gentleman, an extremely productive scientist."

Apart from his work and family, Chamberlin had a great variety of interests. He had an encyclopedic knowledge of history, philosophy and the great literature. He was especially fond of reading poetry, and would often enliven conversations with recitations from

memory. If he had so chosen, he could probably have become an outstanding writer. Though he did not become seriously interested in photography until his mid-fifties, he quickly became an accomplished photographer, winning many awards in various Color Slide Salons of the Photographic Society of America and attaining the status of a three-star exhibitor. He also helped organize the Forest Grove Camera Club, where he was always willing to pass on his skills.

As the years passed, his career and other vicissitudes of life demanded an increasing share of his time, severely limiting his work on the false scorpions. His earlier systematic papers had been planned as preludes to generic revisions of the families, but only two of these, on the Tridenchthoniidae and Hyidae, were to appear. Another difficulty was that his later descriptions became increasingly detailed and time consuming.

In the late 1950s, Chamberlin met David Malcolm at a meeting of the Oregon Entomological Society. When Malcolm, who had recently completed a Ph.D. on phytophagous mites, expressed an interest in working on a different arachnid group, Chamberlin naturally asked whether he had considered pseudoscorpions and invited him to his lab in Forest Grove. This resulted in their collaboration on the cavernicolous northern American pseudoscorpions that had been accumulating in Chamberlin's collection, a subject that had been barely touched upon previously.

Beginning in the mid-1940s, Chamberlin started to experience the first symptoms of emphysema (a little-known disease at the time), which progressively worsened. The loss of function in his left lung in 1918, now became an overwhelmingly negative factor in the course of this disease. In February 1961, he was finally forced to take an early retirement from his position with the U.S. Department of Agriculture. A little more than a year later, on 17 July 1962, he died in a hospital in Hillsboro, Oregon, at the age of 63. His pseudoscorpion collection—the largest ever in private hands—passed to David Malcolm. This, together with Chamberlin's unpublished files and the collections of Malcolm and Ellen Benedict, has recently been deposited at the California Academy of Sciences.

In the preface to *The Arachnid Order Che- lonethida*, Chamberlin expressed a hope that

it would "furnish a base or starting point for the student of false scorpions similar to that afforded by the various manuals of other groups, among which we may specifically note Williston's *Manual of North American Diptera* and Comstock's *Spider Book*." It did more than that. No other work on a major group of arachnids has defined its subject with the same clarity, conciseness and authority. Chamberlin's flair for the interpretation of characters and the recognition of natural groups has left an indelible mark; he deserves to be remembered as one of the great arachnologists.

#### ACKNOWLEDGMENT

Help with the initial stages of this account was kindly provided (to MJ) by David R. Malcolm (Hillsboro, Oregon).

**Mark Judson**  
**David C. Chamberlin**

#### LITERATURE CITED

(other than by J.C. Chamberlin)

- Ferris, G.F. 1928. The principles of systematic entomology. Stanford Univ. Publ., Univ. Ser. (Biol. Sci.), 5(3):101-269. [MS by J.C. Chamberlin quoted on pp. 219-222.]
- Harvey, M.S. 1992. The phylogeny and classification of the Pseudoscorpionida (Chelicerata: Arachnida). *Invert. Taxon.*, 6:1373-1435.
- Schawaller, W., W.A. Shear & P.M. Bonamo. 1991. The first Paleozoic pseudoscorpions (Arachnida, Pseudoscorpionida). *American Mus. Novit.*, 3009:1-17.
- Slevin, J.R. 1923. Expedition of the California Academy of Sciences to the Gulf of California in 1921. General account. *Proc. California Acad. Sci.*, (4) 12 [1922] (6):55-72, 1 map.

#### PUBLICATIONS BY J.C. CHAMBERLIN

##### *General:*

- Chamberlin, J.C. 1924. Concerning the hollow curve of distribution. *American Nat.*, 58:350-374.
- Becking, L.B. & J.C. Chamberlin. 1925. A note on the refractive index of chitin. *Proc. Soc. Exp. Biol. Med.*, 22:256-257.
- Chamberlin, J.C. 1925. Heavy mineral oil as a permanent non-volatile preservative for valuable biological material. *Science*, 61 (1590):634-635.
- Ferris, G.F. & J.C. Chamberlin. 1928. On the use of the word "chitinized." *Entomol. News*, 39: 212-215.

*Chelonethida (false scorpions):*

- Chamberlin, J.C. 1921. Notes on the genus *Garypus* in North America (Pseudoscorpionida—Cheliferidae). *Canadian Entomol.*, 53:186–191.
- Chamberlin, J.C. 1923. The genus *Pseudogarypus* Ellingsen (Pseudoscorpionida—Feallidae). *Entomol. News*, 34 (5):146–149; (6):161–166, pl. 5.
- Chamberlin, J.C. 1923. New and little known pseudoscorpions, principally from the islands and adjacent shores of the Gulf of California. *Proc. California Acad. Sci.*, (4) 12 (17) [1922]:353–387.
- Chamberlin, J.C. 1923. On two species of pseudoscorpion from Chile with a note on one from Sumatra. *Rev. Chilena Hist. Nat.*, 27:185–192.
- Chamberlin, J.C. 1924. Preliminary note upon the pseudoscorpions as a venomous order of the Arachnida. *Entomol. News*, 35:205–209.
- Chamberlin, J.C. 1924. The Cheiridiinae of North America (Arachnida—Pseudoscorpionida). *Pan-Pacific Entomol.*, 1 (1):32–40.
- Chamberlin, J.C. 1924. Giant *Garypus* of the Gulf of California. *Nature Mag. (Washington, D.C.)*, 2 (Sept.):171–172, 175.
- Chamberlin, J.C. 1924. *Hesperocheernes laurae*, a new species of false scorpion from California inhabiting the nest of *Vespa*. *Pan-Pacific Entomol.*, 1 (2):89–92.
- Chamberlin, J.C. 1925. On a collection of pseudoscorpions from the stomach contents of toads. *Univ. California Publ. Entomol.*, 3 (4):327–332.
- Chamberlin, J.C. 1926. Papers from Dr. Th. Mortensen's Pacific Expedition, 1914–16. XXXVI. Notes on the status of genera in the Chelonethid family Chthoniidae together with a description of a new genus and species from New Zealand. *Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn*, 81:333–338.
- Chamberlin, J.C. 1929. *Dasycheernes inquilinus* from the nest of meliponine bees in Colombia (Arachnida: Chelonethida). *Entomol. News*, 40:49–51.
- Chamberlin, J.C. 1929. *Dinocheirus tenoch*, an hitherto undescribed genus and species of false scorpion from Mexico (Arachnida—Chelonethida). *Pan-Pacific Entomol.*, 5 (4):171–173.
- Chamberlin, J.C. 1929. The genus *Pseudochthonius* Balzan (Arachnida—Chelonethida). *Bull. Soc. Zool. France*, 54 (3):173–179.
- Chamberlin, J.C. 1929. A synoptic classification of the false scorpions or chela-spinners, with a report on a cosmopolitan collection of the same. — Part 1. The Heterosphyronida (Chthoniidae) (Arachnida—Chelonethida). *Ann. Mag. Nat. Hist.*, (10) 4:50–80.
- Chamberlin, J.C. 1929. On some false scorpions of the suborder Heterosphyronida (Arachnida—Chelonethida). *Canadian Entomol.*, 61:152–155.
- Chamberlin, J.C. 1929. The comparative morphology of the arachnid order Chelonethida. *Stanford Univ. Bull.*, (5) 78 [Abstracts of dissertations, Stanford Univ. 1928–1929, vol. 4]:25–27.
- Chamberlin, J.C. 1930. A synoptic classification of the false scorpions or chela-spinners, with a report on a cosmopolitan collection of the same. — Part II. The Diplosphyronida (Arachnida—Chelonethida). *Ann. Mag. Nat. Hist.*, (10) 5:1–48, 585–620.
- Chamberlin, J.C. 1931. *Parachernes ronnaii*, a new genus and species of false scorpion from Brazil (Arachnida—Chelonethida). *Entomol. News*, 42:192–195.
- Chamberlin, J.C. 1931. The arachnid order Chelonethida. *Stanford Univ. Publ., Univ. Ser.*, (Biol. Sci.) 7(1):1–284.
- Chamberlin, J.C. 1931–32. A synoptic revision of the generic classification of the chelonethid family Cheliferidae Simon. (Arachnida). *Canadian Entomol.*, 63 [1931]:289–294; 64 [1932]:17–21, 35–39.
- Chamberlin, J.C. 1932. On some false scorpions of the superfamily Cheiridioidea (Arachnida, Chelonethida). *Pan-Pacific Entomol.*, 8 (3):137–144.
- Chamberlin, J.C. 1933. Some false scorpions of the atemnid subfamily Miratemninae. (Arachnida—Chelonethida.). *Ann. Entomol. Soc. America*, 26 (2):262–268, pl. 1.
- Chamberlin, J.C. 1934. On two species of false scorpions collected by birds in Montana, with notes on the genus *Dinocheirus* (Arachnida—Chelonethida). *Pan-Pacific Entomol.*, 10 (3):125–132.
- Chamberlin, J.C. 1934. Check list of the false scorpions of Oceania. *Occ. Pap. B.P. Bishop Mus.*, 10 (22):1–14.
- Chamberlin, J.C. 1935. A new species of false scorpion (*Hesperocheernes*) from a bird's nest in Montana. *Pan-Pacific Entomol.*, 11 (1):37–39.
- Chamberlin, J.C. 1935. Chelonethida. Pp. 477–481. *In A Manual of the Common Invertebrate Animals (Exclusive of Insects)* (H.S. Pratt, ed.). Blakiston: Philadelphia.
- Chamberlin, J.C. 1938. A new genus and three new species of false scorpion from Yucatan Caves (Arachnida—Chelonethida). *Publ. Carnegie Inst., Washington*, 491:109–121.
- Chamberlin, J.C. 1938. New and little-known false-scorpions from the Pacific and elsewhere. (Arachnida—Chelonethida.) *Ann. Mag. Nat. Hist.*, (11) 2:259–285.
- Chamberlin, J.C. 1939. Tahitian and other records of *Haplocheernes funafutensis* (With) (Arachnida: Chelonethida). *Bull. B.P. Bishop Mus.*, 142:203–205.
- Chamberlin, J.C. 1939. New and little-known false scorpions from the Marquesas Islands (Arachnida: Chelonethida). *Bull. B.P. Bishop Mus.*, 142:207–215.
- Chamberlin, J.C. 1943. The taxonomy of the false

- scorpion genus *Synsphyronus*, with remarks on the sporadic loss of stability in generally constant morphological characters (Arachnida: Chelonethida). *Ann. Entomol. Soc. America*, 36 (3): 486–500.
- Chamberlin, J.C. & R.V. Chamberlin. 1945. The genera and species of the Tridenchthoniidae (Dithidae), a family of the arachnid order Chelonethida. *Bull. Univ. Utah*, 35 (23) (Biol. Ser., 9 (2)):1–67.
- Chamberlin, J.C. 1946. The genera and species of the Hyidae, a family of the arachnid order Chelonethida. *Bull. Univ. Utah*, 37 (6) (Biol. Ser., 9 (6)):1–16.
- Chamberlin, J.C. 1947. Three new species of false scorpions from the island of Guam (Arachnida, Chelonethida). *Occ. Pap. B.P. Bishop Mus.*, 18 (20):305–316.
- Chamberlin, J.C. 1947. The Vachoniidae, a new family of false scorpions represented by two new species from caves in Yucatan (Arachnida, Chelonethida, Neobisioidea). *Bull. Univ. Utah*, 38 (7) (Biol. Ser. 10 (4)):1–15.
- Chamberlin, J.C. 1949. New and little-known false scorpions from various parts of the world (Arachnida, Chelonethida), with notes on structural abnormalities in two species. *American Mus. Novit.*, 1430:1–57.
- Chamberlin, J.C. 1952. New and little-known false scorpions (Arachnida, Chelonethida) from Monterey County, California. *Bull. American Mus. Nat. Hist.*, 99:259–312.
- Malcolm, D.R. & J.C. Chamberlin. 1960. The pseudoscorpion genus *Chitrella* (Chelonethida, Syarinidae). *American Mus. Novit.*, 1989:1–19.
- Chamberlin, J.C. & D.R. Malcolm. 1960. The occurrence of false scorpions in caves with special reference to cavernicolous adaptation and to cave species in the North American fauna. (Arachnida—Chelonethida.) *American Midl. Nat.*, 64 (1): 105–115.
- Malcolm, D.R. & J.C. Chamberlin. 1961. The pseudoscorpion genus *Kleptochthonius* Chamberlin (Chelonethida, Chthoniidae). *American Mus. Novit.*, 2063:1–35.
- Chamberlin, J.C. 1962. New and little-known false scorpions, principally from caves, belonging to the families Chthoniidae and Neobisiidae (Arachnida, Chelonethida). *Bull. American Mus. Nat. Hist.*, 123:303–352.
- Muchmore, W.B. & J.C. Chamberlin. 1995. The genus *Tyrannochthonius* in the eastern United States (Pseudoscorpionida: Chthoniidae). Part I. The historical taxa. *Insecta Mundi*, 9 (3–4):249–257.
- Crustacea:*
- Chamberlin, J.C. & C.D. Duncan. 1924. Notes on *Lepidurus glacialis* Kroyer Crustacea, Brachiopoda, Apodidae. *J. Entomol. Zool., Pomona College*, 16:99–105, pls. 1, 2.
- Systematic entomology:*
- Chamberlin, J.C. 1923. A revision of the genus *Anisembia*, with description of a new species from the Gulf of California. *Proc. California Acad. Sci.*, (4) 12 [1922] (16):341–351.
- Chamberlin, J.C. 1923. A systematic monograph of the Tachardiinae or lac insects (Coccidae). *Bull. Entomol. Res.*, 14 (2):147–212, pls. 10–20.
- Chamberlin, J.C. 1925. Supplement to a monograph of the Lacciferidae (Tachardiinae) or lac insects (Homopt., Coccidae). *Bull. Entomol. Res.*, 16 (1):31–41.
- Chamberlin, J.C. 1925. A new species of *Lepidosaphes* from China (Hemiptera, Coccidae). *Pan-Pacific Entomol.*, 2 (2):85–87.
- Chamberlin, J.C. 1927. Status and synonymy of the dictyospermum scale. *Monthly Bull. California State Dept. Agric.*, 14 (9):484–491.
- Chamberlin, J.C. & G.F. Ferris. 1929. On *Liparocephalus* and allied genera (Coleoptera; Staphylinidae). *Pan-Pacific Entomol.*, 5 (3):137–143; (4):153–162.
- Economic entomology:*
- deOng, E.R., H. Knight & J.C. Chamberlin. 1927. A preliminary study of petroleum oil as an insecticide for citrus trees. *Hilgardia*, 2 (9):351–385.
- Knight, H., J.C. Chamberlin & C.D. Samuels. 1929. On some limiting factors in the use of saturated petroleum oils as insecticides. *J. Plant Physiol.*, 4:299–321.
- Fulton, R.A. & J.C. Chamberlin. 1931. A new automatic insect trap for the study of insect dispersion and flight associations. *J. Econ. Entomol.*, 24 (3):757–761, pl. 25.
- Annand, P.N., J.C. Chamberlin, C.F. Henderson & H.A. Waters. 1932. Movements of the beet leaf hopper in 1930 in southern Idaho. *U.S. Dept. Agric. Circular*, 244, 24 pp., figs.
- Fulton, R.A. & J.C. Chamberlin. 1934. An improved technique for the artificial feeding of the beet leafhopper with notes on its ability to synthesize glycerides. *Science*, 79 (April 13):346–348.
- Piemeisel, R.L. & J.C. Chamberlin. 1936. Land improvement measures in relation to a possible control of the beet leafhopper and curly top. *U.S. Dept. Agric. Circular*, 416, 25 pp.
- Chamberlin, J.C. & K.W. Gray. 1938. Suggestions for the control of the pea weevil in Oregon with special reference to peas grown for processing. *Oregon State Coll. Exp. Stn. Circular*, 126:23 pp.
- Chamberlin, J.C. & F.R. Lawson. 1940. A mechanical trap for the sampling of aerial insect populations. *U.S. Dept. Agric., Bur. Entomol. & Pl. Quar.*, ET-163:12 pp.

- Chamberlin, J.C. & F.R. Lawson. 1945. A mechanical trap for the sampling of aerial insect populations. *Mosquito News*, 5 (1):4-7.
- Fox, D.E., J.C. Chamberlin & J.R. Douglass. 1945. Factors affecting curly top damage to sugar beets in southern Idaho. U.S. Dept. Agric. Tech. Bull., 897:29 pp.
- Stage, H.H. & J.C. Chamberlin. 1945. Abundance and flight habits of certain Alaskan mosquitoes as determined by means of a rotary-type trap. *Mosquito News*, 5 (1):8-16.
- Brindley, T.A., J.C. Chamberlin, F. Hinman & K.W. Gray. 1946. The pea weevil and methods for its control. U.S. Dept. Agric. Farmers' Bull., 1971: 1-24. (Revised in 1952, under authorship of T.A. Brindley, J.C. Chamberlin & R. Schopp).
- Chamberlin, J.C. 1949. Insects of agricultural and household importance in Alaska. Univ. Alaska Bull., Agr. Expt. Stn. Circular, 9:59 pp.
- Lawson, F.R., J.C. Chamberlin & G.T. York. 1951. Dissemination of the beet leafhopper. U.S. Dept. Agric. Tech. Bull., 1030:59 pp.
- Brindley, T.A. & J.C. Chamberlin. 1952. The pea weevil. U.S. Dept. Agric. Yearbook Agric., 1952: 530-537.
- Chamberlin, J.C. 1953. Characteristics of airplane spray patterns at low flight elevations. Proc. 9th Ann. North Central Weed Control Conf., Winnipeg, Canada, 1952:42-43.
- Chamberlin, J.C., C.W. Getzendaner, H.H. Hessig & V.D. Young. 1955. Studies of airplane spray-deposit patterns at low flight levels. U.S. Dept. Agric. Tech. Bull., 1110:45 pp.
- Chamberlin, J.C. & V.D. Young. 1956. Insecticide applications with aircraft and ground rigs. *Farm Chemicals*, (December):50-53.
- Young, V.D., J.C. Chamberlin, C.W. Getzendaner & C.E. Deonier. 1957. Improved row-crop sprayer and duster for potatoes and other row crops. U.S. Dept. Agric. Res. Service Mimeogr. Bull., ARS 42 - 10:14 pp.
- Chamberlin, J.C. & V.D. Young. 1958. Insecticide applications with aircraft and ground rigs. Proc. 10th Int. Congr. Entomol., Montreal, 1956, 3: 255-260.
- Young, V.D., J.C. Chamberlin, C.W. Getzendaner & C.E. Deonier. 1958. An atomizing nozzle assembly for use with improved row-crop sprayer and duster for potatoes and other row crops. U.S. Dept. Agric. Res. Service Mimeogr. Bull., ARS 42 - 10 (supplement):7 pp.
- Chamberlin, J.C. 1959. Thomas Roscoe Chamberlin, Sr. 1889-1958. *J. Econ. Entomol.*, 52 (1): 181-182.

*Manuscript received 10 July 1998, accepted 1 September 1998.*